

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
24 June 2004 (24.06.2004)

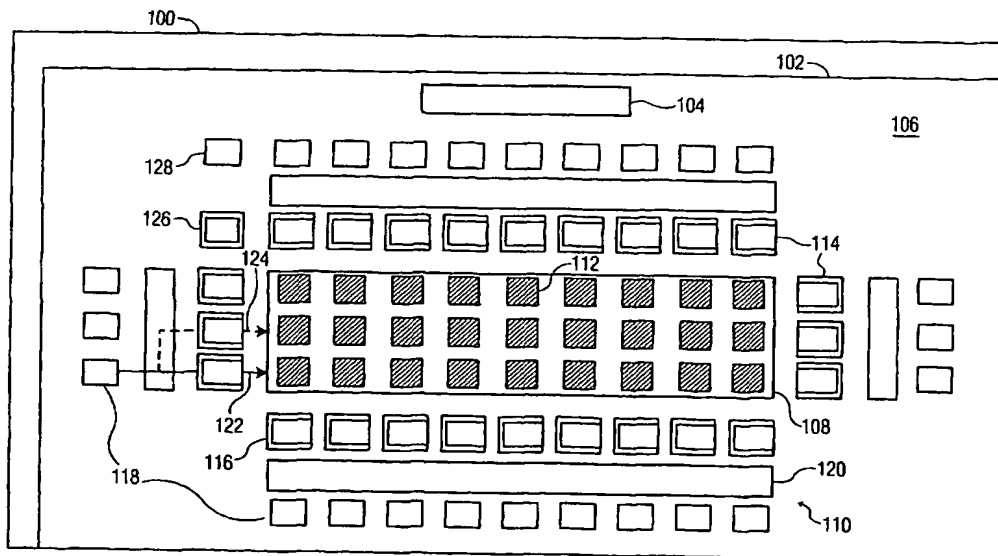
PCT

(10) International Publication Number  
**WO 2004/053716 A3**

- (51) International Patent Classification<sup>7</sup>: **G06F 15/80**
- (21) International Application Number:  
PCT/IB2003/005623
- (22) International Filing Date:  
28 November 2003 (28.11.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/432,971 12 December 2002 (12.12.2002) US  
60/475,166 2 June 2003 (02.06.2003) US
- (71) Applicant (*for all designated States except US*): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **BURNS, Geoffrey F.** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US). **VAIDYANATHAN, Krishnamerthy** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
- (74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o Waxler, Aaron, P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**  
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations*
- Published:**  
— *with international search report*

[Continued on next page]

(54) Title: DATAFLOW-SYNCHRONIZED EMBEDDED FIELD PROGRAMMABLE PROCESSOR ARRAY



(57) Abstract: An embedded field programmable processor includes a two-dimensional array of processing cells for performing mathematical operations whose timing depends on the inflow of operands. An array interface reconfigurably connects paths for the inflow to respective cells on the array periphery. The array is preferably of the systolic type and is preferably implemented with nearest neighbor inter-cell connections.

WO 2004/053716 A3



(88) Date of publication of the international search report:  
17 March 2005

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/05623

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06F15/80

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F G06J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CUCCHIARA R ET AL: "RECONFIGURING THE BOUNDARIES OF A MESH-CONNECTED ARRAY OF PROCESSORS WITH RUN-TIME PROGRAMMABLE LOGIC" MICROPROCESSORS AND MICROSYSTEMS, IPC BUSINESS PRESS LTD. LONDON, GB, vol. 17, no. 2, January 1993 (1993-01), pages 67-73, XP000355541 ISSN: 0141-9331 abstract page 68, left-hand column, line 37 - line 69 page 69, right-hand column, line 22 - line 32; figure 1	1,2,5,6, 8-10,17, 18,20
A	US 6 457 116 B1 (FRENCH ROBERT ET AL) 24 September 2002 (2002-09-24) column 4, line 58 - column 5, line 12 ----- -/-	1,2,5, 10,20

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but after the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

22 December 2004

Date of mailing of the international search report

30/12/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Michel, T

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/05623

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 639 816 A (ACTEL CORP) 22 February 1995 (1995-02-22) claim 1; figure 1	3,7
A	WO 00/77652 A (VORBACH MARTIN ; PACT INF TECH GMBH (DE)) 21 December 2000 (2000-12-21) page 20, line 1 - line 8 page 23, line 7 - line 16 page 43, line 5 - line 10	11,12,19
A	WO 91/19268 A (WAVETRACER INC) 12 December 1991 (1991-12-12) page 5, line 25 - line 34; figure 1	11,12,19
A	HARBAUM T ET AL: "DESIGN OF A FLEXIBLE COPROCESSOR UNIT" PROCEEDINGS OF THE EUROMICRO CONFERENCE, XX, XX, September 1999 (1999-09), pages 335-342, XP000879556 figure 1	1,9,13
A	US 5 892 962 A (CLOUTIER JOCELYN) 6 April 1999 (1999-04-06) the whole document	1,13
A	US 2002/133688 A1 (KURDAHI FADI ET AL) 19 September 2002 (2002-09-19) abstract; figure 1	1,13
A	CALLAHAN T J ET AL: "THE GARP ARCHITECTURE AND C COMPILER" COMPUTER, IEEE COMPUTER SOCIETY, LONG BEACH., CA, US, US, vol. 33, no. 4, April 2000 (2000-04), pages 62-69, XP000948675 ISSN: 0018-9162 page 64, left-hand column, line 2 - line 5	19

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/05623

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6457116	B1	24-09-2002	US 5915123 A 22-06-1999
		US 2002188832 A1 12-12-2002	
		US 2003163668 A1 28-08-2003	
		US 2004205321 A1 14-10-2004	
EP 0639816	A	22-02-1995	US 5457644 A 10-10-1995
		EP 0639816 A2 22-02-1995	
		JP 7086921 A 31-03-1995	
		US RE37048 E1 06-02-2001	
WO 0077652	A	21-12-2000	DE 19926538 A1 14-12-2000
		AU 5805300 A 02-01-2001	
		CN 1378665 T 06-11-2002	
		WO 0077652 A2 21-12-2000	
		DE 10081643 D2 29-05-2002	
		EP 1228440 A2 07-08-2002	
		JP 2003505753 T 12-02-2003	
WO 9119268	A	12-12-1991	US 5193202 A 09-03-1993
		AU 7981891 A 31-12-1991	
		EP 0531431 A1 17-03-1993	
		JP 5509184 T 16-12-1993	
		WO 9119268 A1 12-12-1991	
US 5892962	A	06-04-1999	CA 2215598 A1 12-05-1998
US 2002133688	A1	19-09-2002	NONE